

*Donum Domini
Hent.*

Querela Geometrica:

O R,

GEOMETRY'S Complaint

Of the Injuries lately received from

Mr. THOMAS WHITE

In his late Tract,

Entituled,

Tutela Geometrica.

In the end you have some
Places at large out of Mr. *white's*
TUTELA, and *Gulden's* CENTRO-
BARYCA, Reprinted, and faithfully
Translated into English.



LONDON,

Printed by R. W. 1660.





The Publisher
TO THE
R E A D E R.

HAVING in the following Letter from my Friend, receiv'd a brief account of Mr. Whites so much fam'd and expected Geometrical Treatise, I thought fit to publish it for satisfaction of many, very desirous to understand the success he has had therein.

Know then, that the Letter consists of two parts. The first demonstrates the many and gross Errors against Geometry, committed by Mr. White in his Tutela Geometrica: which yet he terms his Chrysaspis, or Golden Shield, wherewith to defend all his other Works.

The latter part layes open his most unworthy proceeding against a famous Mathematician, by charging him with many and evidently false imputations, on purpose to disgrace him. From all which he is here fully vindicated, as well in the ensuing Letter, as in the Additionals.



Querela Geometrica :

O R,

Geometry's Complaint

Of the Injuries received lately from

TUTELA GEOMETRICA.

O R,

The Copy of a *Misive*, &c.

S I R,

I Have, according to your request, perused the small Geometrical Tract lately published by Mr. *Thomas White* : whereof accordingly I give you here this brief account. The intent and occasion of his present Writing, as on this Subject,

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(having scarce hitherto appeared
 in that kinde) is (as is manifest
 by the Title) to make known to
 the world the great light he hath
 received particularly from God
 in that noble Science of Geome-
 try; as having never studied it,
 nor much applied himself that
 way: that thereby other men,
 conceiving this so excellent a
 Piece must needs have been con-
 veyed to him by particular
 light from Heaven, may learn
 thence more to prize and esteem,
 then hitherto they have done, his
 Works already published. For
 so he tells his Reader in the end
 of his Preface, that the things he
 is now to declare, ought to be
 sufficient to give esteem to all his
 former Labours. For if (saith
 he) they came from the Author,
 and from that force and vigour of
 Wit, by which he is able to per-
 form many more equal to this,
 then

then his precedent Works are not to be contemned, as proceeding from such a Father, *quia de tali exorta sunt Patre*: But if it come from Heaven, then much more are his other Works worthy consideration, to wit, as coming also from Heaven before it.

Now that they come not from himself, he openly avouches, as having never had any Master in Geometry, nor much applied himself to that Science, or read so much as *Euclide*. Yea, he freely acknowledges himself so little versed in Geometry, that he plainly affirms, no man will call him a Geometrician, if he be one himself: *Intuere me hominem, quem nemo Geometram salutet, modo ipse sit*. Whence he concludes, that the things he is now to deliver, must assuredly come from Heaven: *Talis cum sim, non à me hac habes, sed ab eo, qui ex legibus*

Providentia sua, ea gubernationi Ecclesiae suae, in hoc rerum articulo, opportuna & fecit, & vidit. Being I am such a one; (to wit, so little vers'd in Geometry) thou hast not these things from me, but from him, who according to the Laws of his Providence, both saw and made them fit for the Government of his Church, in this present conjuncture: give him the thanks, &c. Wherefore he exhorts the Reader, not to neglect his own good, nor contemn a wonder fallen to him from Heaven. *Quod superest, tibi consule, & ostentum a calo ad te delapsum ne contemnito.*

All this with some other such expressions hath Mr. *white* in his Preface; whereby you clearly see, how highly he values this his Tract, as fallen from Heaven, and accordingly desires the like esteem should be framed of all

all his other Works: that so his Readers considering and weighing with themselves, that it is impossible so learned and subtil a work should come from one that never studyed Geometry, must necessarily conclude that it came particularly from Heaven: and by consequence also have a better esteem, then hitherto, of his former Labours, as undoubtedly coming from the same place.

This is the aim and drift of Mr. *white* in this his *Tutela*; wherein truly he seems, by so far expressing himself, to have given a very great advantage to who-soever will impugne his former Writings. For now his Adversary hath no more to do, but to shew (as easily he may) that this Geometry never came from Heaven, and by consequence, that neither any of his former Works, (whereof Mr. *white* would have

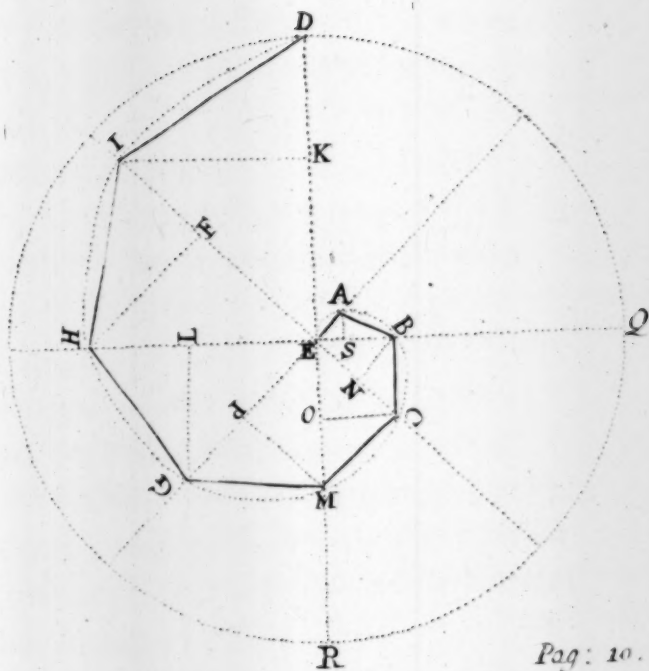
this to be a pattern according to which they are to be measured) ever came from thence. This I say he will easily make manifest; for it is impossible, that ever so weak a piece, as this is, and with so many Patent and open errors against Geometry (as we shall presently see) should ever come from any Geometrician, much less from Heaven. Which that it may appear, we will briefly run over the Propositions, as they are in the Book, to see which of them may deserve to be thought to have particularly descended from Heaven: and then note onely some more patent and obvious errors, such as you your self may easily conceive: by which you may guess at the rest, and what can be here expected.

His Treatise then contains in all thirteen Propositions; of which the two first onely explicate

cate the terms he is to use. The two next are taken out of his Brother, Mr. *Richard Whites* Book called *Hemisphaerium dissectum*, as he also acknowledges; so that certain it is, that these first four came not from Heaven. The five following aim at the *Quadratura Circuli*, but perform no more then a hypothetical, or conditio-
 nate Quadrature: that is, if such or such a proportion were known, it were possible to square a circle; but of such Quadratures as these, we have enough already, and books are every where full of them. For the rest, I finde nothing in these propositions truly demonstrated, that may not be found in other Authors: so that in these nine first Propositions, we have nothing that may be thought a wonder fallen from Heaven, as was promised.

In the Annotation before the
 tenth

tenth Proposition he endeavours to demonstrate, that a Spiral line of the first revolution is precisely equal to half the circumference of the including circle. For example that the Spiral, noted here by the pricked line $EABCMGHID$, is equal to the half circumference, DQR . This Demonstration indeed seems to have somewhat of the extraordinary in it: but yet it is neither new, nor true; and so impossible it should come from Heaven. For this self-same Demonstration was found out above thirty years ago by one *Gulden* a Jesuite: and is to be seen in his Book, called *Centrobarryca*, or, *De centro Gravitatis*; as Mr. *White* here also acknowledges. This Demonstration, I say, *Gulden* found out, and shews in the said Book, *lib. 2. c. 2. prop. 6.* But afterwards, before the Book was printed,



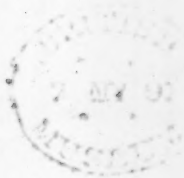
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printed, being ~~admitted~~ of the falsity found out by calculation, and perceiving it to be so, he presently recalled the same in the next Chapter, and clearly shews, that not onely the Spiral line it self is bigger then the said half circle, to which before he thought it was equal; but also evidently shews, that the sides of an inscribed Polygone of twelve Angles is also bigger then the said half circumference, as I shall afterwards declare.

Of this *Guldens* recalling Mr. *white* (as himself testifies) was by some friends informed; but not being able, as it seems, to examine *Guldens* calculation; nor to see the force of it, he presumed to print the said Demonstration, as his own, and to maintain it to be good, and evident, and *Guldens* calculation, or retractation, to be manifestly false, as we shall presently see.

This



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This

This Demonstration I say, Mr. *white* let pass to the print; yet conceiving, as it seems, that people would still think it to be taken out of *Gulden*, it being the very same with his, he thought good to joyn thereto another of his own, demonstrating the same assertion, in a different way from the former; which he performs in the tenth and eleventh Propositions. And certain it is, that this Demonstration is wholly his own, that is, that it neither came from Heaven, nor from any other Geometrician; it being impossible, that so many and patent errors should come from any that ever studyed Geometry, or read so much as *Euclide*; or even knew but how to resolve a plain Triangle.

For in the tenth Proposition he affirms and pretends to demonstrate, first, that if in a
Spiral

Spiral line of the first revolution, be inscribed a Polygone with equal angles, (as in the adjoynd Diagram, you see here inscribed the Polygone E A B C M G H I D, with eight equal angles) that then the sides of the said Polygone shall equally exceed each other: that is, as much as D I exceeds I H, so much precisely shall I H exceed H G, and H G exceed G M; and so of the rest.

Secondly, he affirms this common excess to be equal to the least side of all; viz. to the side E A. These two Assertions he puts in the Title of the said tenth Prop. which is this, *Latera Polygoni inscripti spirali per aequales angulos exuperant sese invicem per excessus minimo lateri aequales.*

Thirdly he likewise affirms, that having let down from the points I, H, G, M, &c. Perpendiculars

diculars to the opposite Semidiameters, (as here you see let down the Perpendiculars I K, H F, G L, &c.) that then the parts of the said Semidiameters, intercepted between the Perpendiculars and the Spiral, that is, the parts K D, I F, G L, and so of the rest, shall be equall. This third he inferres (though falsely, as presently we shall see) about the middle of the said tenth Prop. in these words, *Aequales itaque sunt rectae* K D, I F, & H L. all which three Assertions are evidently false, as I shall briefly shew.

For if we put the Semidiameter E D (which according to the construction of the Spiral, is here supposed to be divided into eight equal parts) to contain 800 equal parts; the next E I will contain 700: and E H will have 600, and E G 500, and so forward:
So

So that the first $E A$ will have 100, and $E B$ 200, &c.

Whereby we have now in every Triangle $E D I$, $E I H$, $E H G$, &c. two sides known, together with the angle comprehended.

For example, in the Triangle $E D I$, we have the side $E D$ 800, and $E I$ 700, together with the comprehended angle $D E I$ of 45 degrees. So likewise in the Triangle $E I H$, we have $E I$ 700, $E H$ 600, and the angle $I E H$ 45 degrees as before, and so of all the rest. Which being known, we may presently by resolving the said Triangles, finde the two last sides of the inscribed Polygone, to wit $D I$, and $I H$, to contain the one 581, and the other 505, whose difference or excess is 76. But if in the same manner we resolve the first Triangle $E A B$, we shall finde the
 T second

second side A B to be onely 147, from whence being taken the first side E A 100, shews the difference between the first and second side to be onely 47. And so in like manner will the difference between the second and third, A B and B C be onely 65. Now these three differences or excesses, 76, 47, and 65, are far from being equal, as Mr. *white* would have them. Wherefore in this he must needs confess himself quite mistaken, and his demonstration thereof to be false.

Neither is his error less notorious in affirming the said excess, (which he also falsely supposes to be common to all) to be equal to the least side, that is, to the side E A: for E A being 100, is bigger then any of them all, as we have seen. Yea, he is so inexcusable in this, that his very eyes might have discovered the error.

His

His third Assertion is also as false and unexcusable, to wit, that the lines KD , FI , LH , &c. are all equal. For resolving the Triangles EIK , EHF , and EGL (in which you have a side with all the Angles) you will finde EK 495. EF 424. and EL 353 which being respectively subtracted from ED 800 EI 700. and EH 600, leave KD 305, FI 276, and LH 247. which three numbers are also far (as you see) from being equal, as Mr. *white* pretends to have demonstrated. Wherefore we must needs here conclude, that such Demonstrations as these never came from Heaven, as Mr. *white* perswades himself, and would have us believe. And truly whosoever reads this ninth Prop. will clearly see his want of Principles, and that he was fallen upon a business he un-

derstood not : wherein he was so puzzled, that he quite forgot what he had said he would prove, to wit, that the said common excess was equal to the least side : for of this, after he had put it in the title, he makes no more mention, nor once goes about to prove it.

Now out of so weak and false a ground as this of the tenth Prop. he demonstrates in the eleventh (at least he thinks so) that the Spiral line $E A B C M G H I D$, is equal to the half circumference $D Q R$: but again performs it so unskilfully, that although the ground now laid in the tenth were true, yet follows not his intent. For by shewing onely that it is not bigger, he inferrs it to be equal ; which is no consequence, although the Antecedent were true : but both the one and the other

other are false, as we shall presently see.

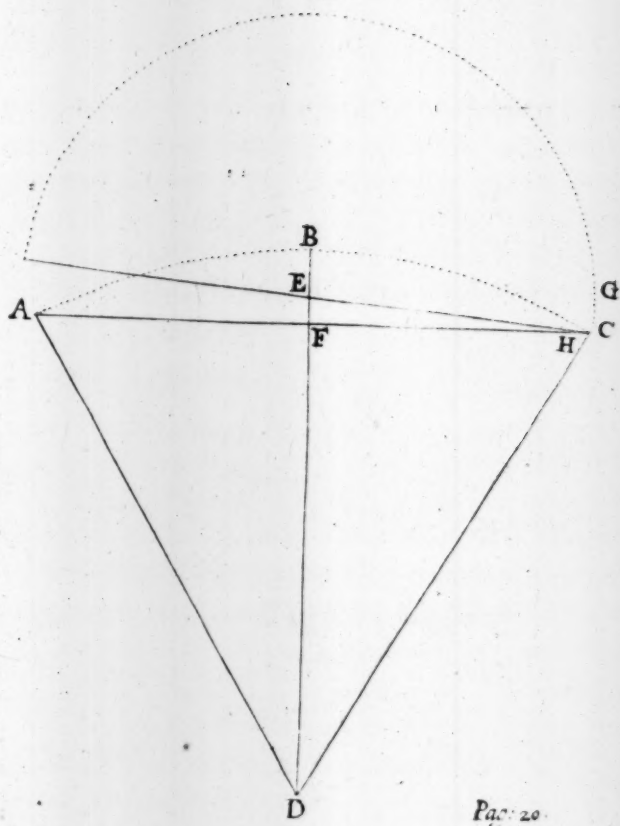
Now after so weak and false a Demonstration, by which he thinks he hath concluded the said Spiral and half circumference to be equal, he proceeds in the twelfth Prop. to refute *Gulden*; who recalling (as was said) this very Demonstration, (which now Mr. *White* pretends to be his own, and maintains to be good) clearly shews, that not only the Spiral it self is bigger then the said half circumference; but also an inscribed Polygone, for example of twelve equal angles, is considerably bigger.

To confute this assertion of *Gulden*, Mr. *White* puts his twelfth Prop. wherein he pretends to demonstrate against *Gulden*, that the sides of such a Polygone being added together are

B 2 less

less then the said half circumference : but truly with a Demonstration like the rest, that is most false and frivolous. For having put the line EC in the Diagram of the said twelfth Prop. (which Diagram I have here adjoyned) to be the greatest side of a Polygone inscribed with twelve equal angles, he supposes that the same longest side EC being taken six times, will be equall to all the sides of the said Polygone added together : for so he writes a little after the beginning of the aforesaid twelfth Prop. *Claram est itaque, EC sexies repititam, hoc est figuram inscriptam spirali, esse majorem, &c.* Whereby you see that according to Mr. *white* it is all one, to take the longest side of such a Polygone six times, or to take the whole inscribed figure, that is,

all



Page 20

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all the twelve sides added together: which notwithstanding is most false. For if we put the Semidiameter DB , or DC to be 12000, we shall have in the Triangle DEC two sides known, to wit DC 12000, and DE 11000, together with the angle EDC grad. 30. From whence is evidently concluded EC to have 6031. (I omit here alwayes the Fraction as making not to our present purpose) which number taken six times makes onely 36186: whereas all the twelve sides, found out in the same manner and added together, make 40003, as appears in the Table here adjoyned. So that in this supposition Mr. *White* is quite out.

Yet notwithstanding this false supposition, he goes forward to demonstrate against *Gulden*, that

B 3 the

the sides of such a Polygone added together are less then the half circumference; which he performs so confusedly, and unskillfully, that it is impossible to infer any thing to his purpose out of such a discourse. But be the discourse what it will, at last he strongly concludes against *Gulden*, that the sides of the said Polygone are less then the half circumference.

But this his conclusion is most false, as *Gulden* hath evidently shewn, *lib. 2. c. 3. prop. 1.* and may be so apprehended by any man that knows but how to resolve a plain Triangle. For by finding every of the twelve sides of the Polygone in such manner, as we now found the twelfth or longest side *EC* to be 6031, we shall have all their numbers, as appears in the here adjoyn-

ed

(23)

ed Table; all which added together, make, as you see, 40003. Whereas if according to *Archimedes*, you number the said half Circumference, by taking the said Semidiameter E D 12000 thrice with its seventh part, we shall finde the said

12	6031
11	5520
10	5011
9	4505
8	4001
7	3501
6	3006
5	2522
4	2053
3	1614
2	1239
1	1000

half circumference to contain at most on-

<i>Summa lat</i>	40003
<i>Semiperiph</i>	37715
<i>Differentia</i>	2288

ly 37715: which is far less then 40003. And by consequence the sides of a twelve angled Polygone inscribed in a Spiral, are absolutely longer then half the circumference of the first circle, as *Gulden* truly and learnedly shews against Mr. *Whites* so weak

a Demonstration for the contrary, as we have seen.

By these discoveries of so many undeniable errors in his Ageometrical Demonstration, one would judge that Mr. *White* had the least reason of all others to censure any one; yet such is his passion, that he falls bitterly upon *Gulden*, censures, vilifies, and reviles him insufferably, calling his Computation unskillfull, and that he hath not a jot of Mathematick or Geometry in him; terming him one of those half Schollars, who stealing divers excellent things out of other Learned mens Writings, endeavour to make them seem their own, This bitter invective hath Mr. *white* against *Gulden*, a man who never had in the least offended him, perhaps never heard of him, being dead many years since,

since, and so not able now to answer for himself. Take Mr. *Whites* own words at the end of his twelfth Proposition. *Calculus*

itaque Guldenianus imperitus est, & qualem ab ipso acceptari (neque enim vel talem ipse instruxit) decebat:

Homine prorsus Amathematico, ut legenti ipsius scripta pronum est patere. And a little after having taxed his want of hu-

mility and candor, he concludes him to be, *Hominem officij Geo-*

metricij prorsus ignarum; & ex eo semidoctorum genere, qui cum ex

magnorum virorum scriptis egregia multa depeculati fuerint, ut sua

faciant, additis quibusdam levibus, justi voluminis ostentatione se vul-

go discipulorum ostentant, &c. This

gall, whilest Mr. *White* flourish-

ed amongst his admirers with his new Demonstration, might

have affixed some seeming blemish upon *Gulden*, amongst such

Agcome-

Ageometricians as Mr. *white* is,
 but now appearing by what is
 said, to proceed from so unskilful
 a hand, it cannot tend to the dis-
 grace of any, save the censurer,
 who condemns that which he
 understands not. For certainly
 no Geometrician would or durst
 have said so much; the Compu-
 tation being performed accord-
 ing to the 47. 1. *Euclidis*, by the
 extraction of the square Root;
 then which there can be none
 more exact and manifest. As
 for that he calls him *Semidoctus*,
 a half Schollar, one utterly
 void of all Mathematick; that
 he hath stolen out of other mens
 works; and all this immediate-
 ly after so many errors commit-
 ted by himself, he hath put the
 lash into the hands of such, who
 if they please, will quickly know
 to use it; especially being so
 justly provoked by seeing one of
 their

their own Order so wrongfully abused; and will not fail to retort upon him all that he imposes upon *Gulden*. And truly whosoever shall read this Geometrical Treatise (which Mr. *white* esteems the master-piece of all that ever he hath writ) and *Guldens* Book called *Centrobaryea*, will finde so main a difference, that Mr. *white* without any prejudice, by what appears in his, may be scarce thought fit to be *Guldens* Schollar.

And whereas he calls *Gulden* one of those half Schollars, who steal out of other Books, they will easily make it appear, that, whatsoever it be of *Gulden*, certain it is, that Mr. *White* hath stolen that Demonstration out of *Gulden*. For even by his own confession it came not from himself; *Non à me hac habes, &c.* and to say it came from Heaven,

were

were a blasphemy, it being manifestly false, as we have seen: Wherefore it must necessarily be concluded, that Mr. *White* took it out of *Gulden*, who printed it many years ago, as a particular invention of his own; neither can any other Authour be cited, who published it before him.

Truly a man would think Mr. *White* to have already said more then enough in so vilifying, and even trampling upon this Author, especially there appearing no cause for such bitterness. But he is not satisfied to have thus disgraced him, as much as lies in his power, with the note of ignorance in the Science he professes; but he falls upon his Moral Vertues, taxing him of Vanity, want of Humility, Candour, and the like, affirming him *to be so vain, that although he thought he had committed an error, (to wit, in his*
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Demonstration of the Spiral) yet he could by no means be induced to cover it, by blotting it out, or candidly to confess the same, but goes on, framing excuses, as if in the very error he had carried himself gallantly. Master white's words are these in the place now cited: *Et (quod fœdissimum est) tanta vanitatis est, ut cum erravisse se putaverat, neque delendo tegere, neque candidè confiteri sustinuerit; sed excusationes texere, quasi in ipso errore egregiè se gesserit, ostentare pergat, &c.*

○ most unworthy and false calumny ! when I had read these in Mr. white, and compared them with what Gulden says in recalling the said Demonstration of the Spiral, I was amazed, how Mr. white did not even blush when he writ so foul and evident an untruth. For of all that, which he so maliciously here imputes
unto

unto this man, there is not one word to be seen in *Gulden*, nor the least ground or shadow in his writings; yea, the just contrary to what is here so shamefully avouched, doth manifestly appear, as any man may see in his Book called *Centrobarryca*, cited by Mr. *white*. Where *lib. 2. c. 3.* retracting the said Demonstration, he plainly tells the occasion of it; *viz.* that being informed that a certain Mathematician had by Calculation discovered an error in his Demonstration, although at first it made no great impression in him, for he thought himself so secure, that he hoped sooner to finde a thousand errors in that Mathematicians Calculation, then one in his own Demonstration: *Mille potius sperabam me in Calculo huius examinis, inventurum errores, quàm vel unicum in meis inventis; sed contra*
quasi

quasi accidit, &c. But I found, sayes he, just the contrary. For having examined the said Calculation, I clearly saw the error, and was forced to confess it, *Victus debui dare manus.* Whereupon he presently retracts it, and is so far from excusing the error, or refusing to confess it, or bragging as if he had carried himself gallantly therein, (as Mr. *White* most falsely and injuriously imposes upon him) that he plainly and candidly confesses it, saying, that he had rather follow the example of other worthy Authors, who in like case have, to their own praise and profit of others, revoked their errors, then of such as had rather accuse *Archimedes*, *Euclide*, yea, Geometry it self, then once acknowledge the errors of which they were convinced.

As to that whereof Mr. *White* most

most wrongfully taxes him (in those words *neque delendo tegere*) for printing the said Demonstration, although he thought it to be false, *Gulden* gives there also the reason, why he printed it: to wit, that others seeing how he had erred in a Demonstration, which at first sight seemed so currant, might beware of the like fallacy: *Ut sciant sibi cavere a scopulis.*

By all which is most evident, that it was ignorance, and passion, and neither knowledge, nor reason, which extorted these ugly censures from Mr. *white* against *Gulden*: and how far that Author was from that vanity and stubbornness in maintaining what he had once asserted, though he thought it to be false, as Mr. *white* would make the world believe. For I dare maintain, that there is not an Author

to be found, who in the like case hath carryed himself more modestly and candidly then this man hath done: as any, who shall read the said third *chapter, will, to *Guldens* praise and Mr. *whites* confusion, plainly discover. And God grant Mr. *white* may but with as much humility recall and acknowledge what he hath written amiss in matters of more concern, as this man does retract his Mathematical error.

* As you
may see
at the end
of this
Letter.

Wherefore in this so much vilifying of *Gulden*, he hath again put the lash into his adversaries hands, who may use it at their pleasure, and make known unto the world, that no man that had any worth in him, conscience, or moral honesty, would ever so unworthily have carried himself as Mr. *white* hath in this. Yea, they may, if they please, report all that he so wrongfully

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lays

layes upon *Gulden*, most justly upon Mr. *white*: making it appear, that he is rather to be taxed of vanity, as having gotten only some few Tearms of Geometry, (and yet more then he knows well how to use) would faine have the glory of a Mathematician. For although with the one hand he seems to drive it away, yet with the other he draws it to him, as any man but reading his Preface will clearly see. For although he tell his Reader, that he is no Geometrician; and that these so great things (as he fancies them) come not from himself but from God; *Non à me hæc habes*, &c. yet he would have him withall to take notice and well understand, that he is also able even by the force of his natural wit, to perform as great things as these are. For speaking of himself and what he is to deli-

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ver in the said Geometrical Tract, he writes thus: *Author vel suâ industriâ perfecit que offert, vel privilegio magnæ Providentiæ accepit. Si à se, & ingenij eâ virtute, qua plura ejusmodi conficere in parato habeat, certè is est, ut non sint contemnenda illa cætera, quæ in publicum usum elaboravit, &c.* Whereby you see, he plainly tells his Reader, that he hath now already in store divers other things, as good as these. *Plura ejusmodi in parato habet.* And these also found out by the vigour and strength of his own wit. *Eâ ingenij virtute, qua, &c.* Yea although he tells his Reader, that he must onely thank God for these wonderfull things; and that in thanking the Author he shall do him injury, and lay a burden on his shoulders more then he is able to bear: *Mihi si grataris, injuriarum te postulo,*

quod plus in me oneris aggeras, quam cui sim ferendo. Notwithstanding he plainly shews by what you have heard, that he is ready and able to bear more thanks, than I believe his Reader will give him: especially when he shall perceive himself deluded in the Preface, with expectation of wonders from Heaven, and when all is done, finding nothing worth the reading.

But Mr. *white* is not content with so much depressing this Author, but passes further, branding him with the badge of an Heretick, or worse; intimating him to be one of that pernicious Sect of Pedants, who by their prating, labour and endeavour to destroy not onely all humane Sciences, but even Christian Faith it self, by taking all certainty from them. For giving a reason why he so much enveighs against

a man wholly unknown to him, he presently adds, *Quantumvis operæ pretium erat, lectorem monitum reddere de exitiali hac sciolorum secta, quæ sub professione facultatis garriendi, omnem certitudinem, tum è scientiis, tum ex fide Christianâ tollere molitur.* Here Mr. *White* stops; and truly it was time: for having forgot what he first intended, to wit, to draw out a perfect picture of *Gulden*, he hath mistaken the colours, and goes on drawing forth his own, as any man that ever knew them both, will evidently discover.

Now if you ask me what was the main cause, that moved Mr. *White* to this height of passion, he himself tells you, to wit, that he was forced and compelled to utter those censures. And why? Because the shadow (as he says) of *Guldens* great Tome did hinder his Scholars from embracing

cing the truth (he should have said the *falsity*) he proposed to them. For so he writes in the place before cited. *Hac coactus sum de homine ceteroqui ignoto prodere, quia umbra Tomi illustris, per opinionem consequam, officiebam veritati, quam ejusdem studiosis offerebam.* In which words I should rather think Mr. *White* to have wronged his Scholars, in making them such as should be frighted with a shadow. But it seems more probable, that his Scholars better understood the force of *Guldens* Computation, then their Master either would or could, and saw clearly that it did conclude. Howsoever it is most strange, that any wise man for so frivolous a toy as this, should so highly offend both Almighty God and his Neighbour, and so evidently expose his own reputation to the

unavoidable stain of a notorious
Detraكتور.

Truly, as it seems to me, in
this the particular hand of God
shews it self, as well for his own
good, (if he will make use of it)
as for the good of others : in per-
mitting Mr. *white* so to cross his
own designs, that whereas he
thought in this Tract to advance
himself and his former writings,
in the repute of every one, he
should finde the quite contrary.
For whereas he thought thereby
to have got the name of a great
Mathematician, he hath clearly
shewed that he is none; and that
he is indeed onely furnished with
such general Terms and common
Notions in the Mathematicks,
as being with confidence and
boldnesse pronounced in the
company of such, as do no more
thorowly understand them then
himself, are apt to produce in
C 4 their

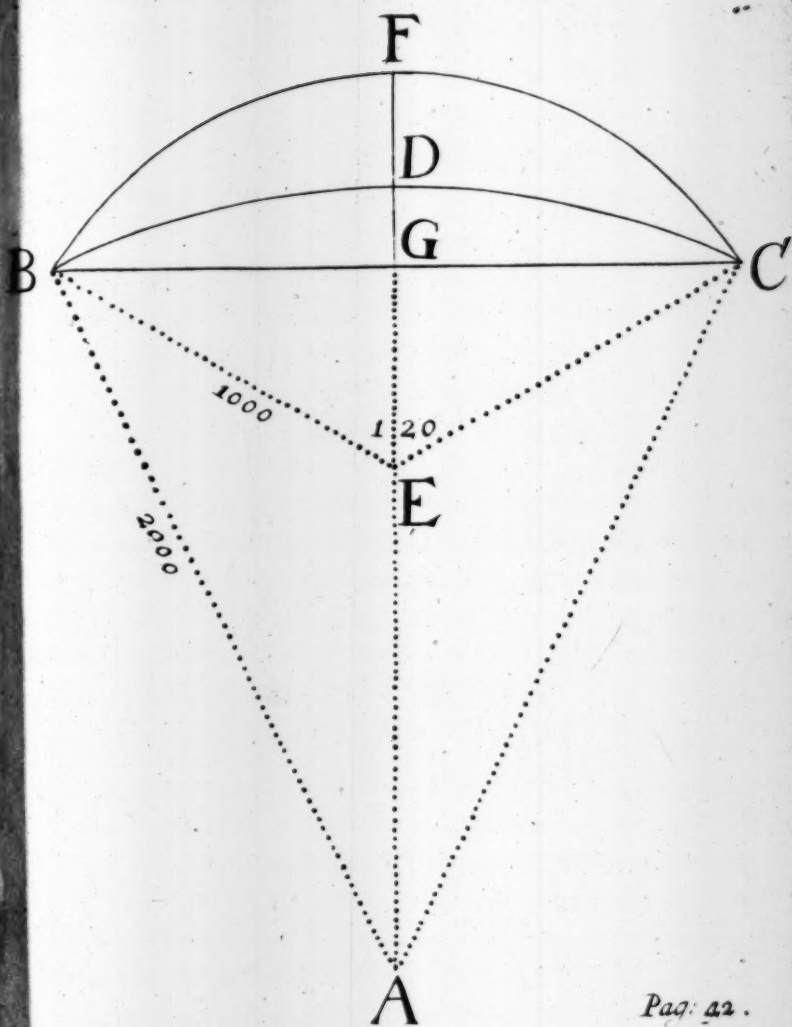
their mindes, an opinion, that the pronouncer is certainly a learned man, & understands exactly what they hear so strongly affirmed by him: whereas if some learned Mathematician should perhaps over-hear him, he would smile to hear so much Geometrical Nonsense. Nay, whereas he assured himself to conciliate an immovable authority to all his former Dictates amongst his admirers, by this unparalleled Demonstration, even some of them (as I am certainly informed) have discovered the weakness of it, and both blush to see it, and labour to hide it. In like manner, whereas (by vertue of his said *Tutela*) he aimed to be accounted a person whom Almighty God particularly designed to use as his Instrument for the governing of his Church in this present conjuncture; and to this effect, to have

have received great light and Infused knowledge from him, as we have heard him speak in his Preface; he hath now given such a Character of himself, that it is impossible, that any man should be so simple as to think, that the wisdom of God would particularly make choice of such an Instrument for so high a Work; to which men of far greater Charity and Perfection of Vertue then he can with any reason or ground be supposed to have, are wont to be called.

This unworthy proceeding of Mr. *White* had made me almost forget to refute his *Quadratura Circuli*, pretended to be shewen in the first nine Propositions: which I deferred to the last, because he in his thirteenth and last Proposition hath put the last hand thereunto, and so confirmed as he thinks the ground thereof, that he

he supposes it now as evident (to use his own phrase) as that a Boar is a Boar.

Wherefore in this thirteenth Prop. he again affirms, what he had before averred in the sixth; to wit, that the Segments, or Portions of unequal circles, having the same Chord, (so that they be less then a Semicircle) are proportional to their Axes. *Portiones circularum inequalium, semicirculo minores, quarum subtensæ sunt æquales, sunt in ratione suorum axium.* For example, in the adjoyned Diagram, he affirms, that the greater Segment $BFCB$ hath the same proportion to the lesser Segment $BDCB$, that the greater Axis FG hath to the lesser DG . This is the ground of his *Quadratura*, which we will now shew to be most false, and by consequence, the whole building to fall. Which
that





that it may the more clearly appear, let us suppose $E B$ or $E F$ the Semidiameter of the greater Segment $B F C B$, to be 1000, and his angle at the Center, $B E C$, to be 120 degrees, or the third part of the whole circle $B F C$: which being supposed we have.

1. $E G$ 500, as being the Sine of the angle $E B C$ 30 degrees, and by consequence the greater Axis $G F$ is also 500.

2. By the usual proportion of the Diameter to the circumference we shall finde the Sector $E B F C$, being the third part of the whole circle, to contain $1047619\frac{1}{2}$.

3. By the Perpendicular $E G$ 500, and the half base $G B$ 866, or Sine of 60 degree. We shall finde the Triangle $E B C$ to contain 433000: which being subtracted from $1047619\frac{1}{2}$ the whole

whole Sector, leaves 614619 $\frac{1}{2}$
for the greater Segment BFCB.

In like manner, if we put A B
the Semidiameter of the lesser
Segment B D C B to be 2000,
that is, double to E B, we shall
finde

1. By the 47. 1. *Eucl.* A G
1802 $\frac{2}{3}$ *proximè* : which taken
from A 2000, leaves 197 $\frac{2}{3}$ for
the lesser Axis G D.

2. By what is known in the
Triangle A B E we shall finde
the angle B A E, whose double
shews the whole angle of the
Sector A B D C, to be 51 degr.
19' 30" from whence by pro-
portion thereof to 360 degr. is
found the Sector A B D C to
contain 1792126.

3. By the Perpendicular A G
1802 $\frac{2}{3}$, and the half base B G
866, is found the Triangle
A B C to contain 1561205 $\frac{1}{2}$,
which being taken from the
whole

whole Sector 1792126, leaves
 230920 $\frac{4}{9}$ for the lesser Segment
 B D C B.

So that now we have the said
 Segments and their Axes, all four
 in numbers, to wit, the greater
 Axis 500, the lesser 197 $\frac{2}{9}$, the
 greater Segment 614619 $\frac{1}{21}$ and
 the lesser 230920 $\frac{4}{9}$ which four
 numbers are by no means pro-
 portional, as they should be, if
 Mr. *whites* Demonstration were
 true. For by saying as 500 to
 197 $\frac{2}{9}$ so 614619 $\frac{1}{21}$ to a fourth,
 there will not be found (as was
 expected) 230920 $\frac{4}{9}$ but another
 number far bigger, to wit,
 242433 $\frac{1}{3}$ the difference being (as
 you see) 11512 $\frac{8}{9}$. Which great
 difference shews evidently the
 falsity of Mr. *whites* Assertion.
 Yea, if we put the greater Seg-
 ment to want but very little of a
 Semicircle, for example onely
 one Minute, or one Second, &c.
 the

the error will be yet more notorious, and the proof more easie. For then the greater Axis will be 1000 *proximè*, and the greater Segment will be 1571428: the lesser Axis will be 268: and the lesser Segment 363238. which four numbers are yet far more disproportional: for by saying as 100 to 268: so 1571428 to a fourth, we shall finde 411142, which is greater then 363238 by 47904, almost an eighth part of the lesser Segment. So Mr. *whites* Demonstration of the *Quadratura* comes to just nothing. But this is like the rest: for with him Demonstrations are nothing but stout and undaunted asseverations, proved by a company of Terms (that make a shew of learning to the unlearned) jumbled at a venture together.

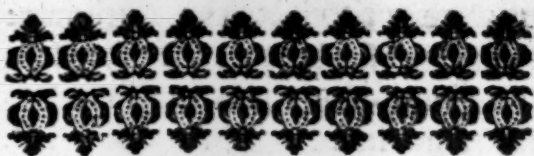
Some perhaps, to excuse this
so

so gross an error of Mr. *Whites*, will say, that by *Portiones Circulorum* he meant not the Segments, as we have said, but only the Arches or Circular Lines B F C and B D C. But this explication will not suffice: for neither had this been to his purpose for the *Quadratura*: nor in it self is it true. For neither are these Arches proportional to the said Axes; the one B F C being $209\frac{1}{2}$ and the other B D C being $1792\frac{1}{2}$ which numbers have by no means the same proportion that 500 hath to 197 $\frac{1}{2}$ as a blinde man may see. Wherefore Mr. *White* must be content to lay up this Error with the rest.

And thus much, Honoured Sir, concerning such things as Mr. *White* pretended here to demonstrate, but hath not performed. But if you ask me what he hath in this little Treatise truly and clearly

clearly demonstrated, I can only answer, that he hath demonstrated; first that he hath a great deal of vanity: secondly, that he hath very little or no Geometry: and thirdly, that he hath as little or less charity. For the rest, I have no more to say at present, but hoping you will rather reflect upon what is here said, then upon the rude and unpolisht Style by which it is exprest, I remain

Your humble Servant.



The Publisher

T O T H E

R E A D E R.

HAVING Printed the precedent Letter, and understanding before the publishing of it, that Mr. *Whites Tutela* so often mentioned, was suppress'd, no more Copies to be had, whereby the Reader might receive satisfaction in conferring what is here said, with the Authors own words: I thought good to annex such places, *verbatim* out of Mr. *Whites* Book, as are touch'd in the said Letter. To which purpose I have also adjoyned *Guldens* Retraction of his Spiral, taken out of his Book, *de Centro Gravitatis*, the Book it self being dear, and scarce to be got. I have put both these, first in Latine, as
 D they

they were written by the Authour: next in English, because the precedent Letter mentioning them, is also in English. And first I will set down Mr. *Whites* Preface to the Reader, there being first mention made of it in the precedent Letter. Which Preface is to be seen in the beginning of the said Book, to which he frames this Title,

CHRYSAEPIUS,

Seu

*Scriptorum suorum in Scientiis obscurioribus Apologia vice
propalata*

TUTELA GEOMETRICA

Ad Lectorem Cordatum &
Serium.

Aristotelis (dicam, an Natura?)
pomaria extenderat Digbaeus Eques, coactis in pellucida stativa Naturae partibus, quas turbide miscuerat generationum necessitas. Solum, fundatura Substructiones, occupaverat quanti ipsa moles, rari densique supra serpentium ludis tessellata. Proximo sese exposuit gradu fraterna elementorum

rum acies, primis (ut appellant) armata qualitatibus. Hac obnixis in alternam internecionem frontibus, consanguineo cruore quanti aream, ad inexhaustam mixtorum ubertatem per admirandos & inscrutabiles plexus ebullientiam irrigant & fecundant. Ornabant mixta Phrygionata secundarum qualitatum Texture; accendebant Actionis & Passionis emicantia & humanum contuitum obtundentia lumina. Sed neque Electricorum assultus & resultus, neque Magneticorum in Homogeneo corpore mutabiles quasi consulto leges; neque Sympatheticorum ex insidiis dolosa & tenebricosa è longinquo Sagittatio, origines & semitas suas à tam acri vestigatore celare valuèrunt. Quin & ad superiora sedilia mixtorum capita planta ascenderunt, & gradum ad animalia promoverunt. Hic se objecèrunt scrutino sensus & sensuum meta, venerandi quodammodo naturae limites: & superati scrutatoris oculum in arcana Anima, & invisum orbem trajecère. Substitit in hanc altitudine Digbaeus, materiam & materiatarum universitatem tanto à se intervallo in imum distantem, non sine horrore despectans; & nobilissi-

bilissimo operi, cui de Immortalitate Animæ nomen fecerat, columnas apposuit. Tantus erat Scientiæ fulgor, ut lippitudini sæculi cecitatem adjiceret, & furebant vanitatis, quæ in multiloquio efflorescit, amatores veritatis imaginem non sustinentes, & potioribus hac scientiis adversari jactabant.

Propterea necessarius erat aliarum Disciplinarum consensus, & rudem acceptaverat ingentis illius opificii Author. Inventus sum, qui etsi Eloquentiæ Decessoris impar & compendio natus, auderem desideratorum Epitomen aggredi, & contractis, quæ fusiùs Digbaeus, & pro rerum qualitate disputaverat; adjectisq; Metaphysicâ tum corporum tum incorporeorum delineatione, Institutiones Peripateticas conderem. Adjeci & Sacras, & opuscula (quamvis nihil meum opusculi molem excedat) nonnulla Philosophica, de Mundo Dialogum, & præfationem ante Latinam Editionem operis Digbaeani. Theologicam quoque Buccinam de Fidei & Theologia Naturâ; & ejusdem defensionem adversus errorem cujusdam Regularis de Personali Infallibilitate Papæ. Præterea de Gratia cum libertate consensu, & me-

dis

dio Animarum statu singula Commen-
 tariola. Non mirum, si hac durius
 excepta sint, quam Digheani labores.
 Cum & infeliciori stylo sint exarata, &
 iter cecioribus obsessum scopulis & ma-
 gis affectuum tempestatibus objectum
 terant. Sed idcirco maximè, quod in
 omnibus Physicam, Metaphysicam, &
 ipsam Theologiam, inaudito conamine
 ad superiores Disciplinas adjungere, &
 Architectonicam contignationem perspe-
 ctabilem in toto processu, & dictorum
 consensum & consequentiarum fidem
 (nihilominus citra rigoris Geometrici
 ostentationem) in eas inducere tentave-
 rim. Quare hunc desiderari suspicatus
 duos Euclidas, Physicum majorem natu,
 adolescentiorem Metaphysicum effudi,
 non vana spei futuros vades. Verum
 enim verò etiam hanc evidentiam obsti-
 natâ incredulitate opprimi sum exper-
 tus. Quid super mihi reliqueram? Me-
 mineram à Novatoribus fidei posci mi-
 racula. Sed ad ea quæ suâ evidentia sta-
 bilienda erant, flagitare argumenta ul-
 trâ vim naturæ posita propudiosum erat:
 attamen si quæ in Scientiarum Thesau-
 ris admiranda laterent miraculis suppa-
 ria, non immeritò ad difficiliorum fidem

adhiberi consentaneum erat. Conjeci itaque oculos in Geometriam, cujus si qua dogmata hujusmodi veneratione consecrata laterent, ea neque alienis ad famam praesidiis indigerent, & suo munis sigillo fidem conciliarent. Et ad verum reservata quadam ab ipsa usque Disciplina infantiâ arcana, quae maximorum ingeniorum labores passa in impossibilem transiverant classem. Pappus & plerique posteriores Geometrae tres Problematum ordines declaraverant; quorum infimus regulâ & circino perficiebatur; medius corporum sectilium vi; supremum non nisi fictitiis lineis subiciebant. Et in posterioribus haec arcana recondiderant. Vieta etiam adjectis argumentis quadam aμίχῃ demonstravisse visus est. Cartesius desperatam rem agnovit. Plerique proposito Problemati satisfacisse sibi visi sunt, si ad hoc redeissent, ut eo soluto monstrarent aliquod clausorum istiusmodi esse resecretum. Te testem invoco, Maxime Archimedes, in secundâ secundi de Sphaerâ & Cylindro, nisi mendax imponat memoria. Hinc itaque captandam scriptis meis umbram censui. Tu modo apud te in consilium se vocatum

*vocatum hoc pensi habeto. Author vel
 suâ industriâ perfecit quæ offert, vel
 privilegio magnæ Providentiæ accepit.
 Si à se & ingenii eâ virtute, quâ plura
 ejusmodi conficere in parato habeat, certè
 is est, ut non sint contemnenda illa cetera,
 quæ in publicum usum elaboravit; imò
 hoc nomine trutinâ acri digna, quia de
 tali orta sunt patre. Sin ab exerciti
 προνοίας vigilantia profectum hoc munus
 suspicaris, expende quanto fortius te ad
 reliquorum examinationem allegatum
 comperias. Me aspicias? Intuere me
 hominem, quem nemo Geometram
 salutet, modo ipse sit. Neque e-
 nim Geometricæ plenitudinem vel ap-
 petivi. Prelectorem non audiui;
 studium non sum professus; magnorum
 Authorum nullum perlegi, non saltē
 Euclidem. Aliarum Disciplinarum
 ambitio me semper traxit & defixit:
 Geometricorum hunc fructum & spera-
 vi & tuli, ut eorum rigorem ad Meta-
 physica traducerem. Ceteroqui oblecta-
 mento mihi erant, cum desoret potiorum
 commoditas. Talis cum sim, non à me
 hac habes, sed ab eo, qui ex legibus pro-
 videntie suæ ea Gubernationi Ecclesiæ
 suæ in hoc rerum articulo opportuna &*

fecit & vidit : Illi accepta refer. Mihi si grataris, injuriarum te postulo, quod plus in me oneris aggeras, quam cui sim ferendo : & in Deum, à quo avertis quale quale à te debetur benignitatis premium. Quod superest, tibi consule, & ostentum a cælo ad te delapsum ne contemnito.

In English thus.

A
GOLDEN SHIELD:

OR,

A Geometrical Defence

As an APOLOGY for all his
other Writings in the ob-
scurer Sciences.

By

Mr. Thomas White.

As for the Preface, the first part thereof concerns not our present purpose, as speaking onely of the profound research made into nature by that worthy Gentleman, Sir *Kenelme Digby*, (whose learning and respects to Mr. *White* would never certainly have suffered this Geometrical Treatise to pass abroad, had he seen it before it was published) I shall onely English the second, which Mr. *White* falls upon by occasion of an objection that some things touched in Sir *Kenelm's* Philosophy seemed not fully agreeable to Sciences of higher consequence. The refutation of which objection Mr. *White* undertook, and so gives a brief account of such writings as he had published to that effect: and comes at last to this present *Tutela* which he is about to publish, intending it as a defence of all he hath hitherto written, and whereof he speaks to his Reader in these words, *Tu modo apud te met, &c.* as we saw just now.

In English thus.

TAKE gentle Reader this into thy serious consideration, either the
Authour

Author (meaning himself) hath performed the things he here presents thee with, by his own Industry, or by Gods peculiar Providence. If they be the fruits of his own industry, and proceed from that vigour of wit, by which he is also ready to perform many the like: certainly he is a person whose other writings formerly published for the common good, ought not to be contemned. Yea, for this very reason, they deserve a profound consideration, as proceeding from such a Father.

But in case thou consider them as coming from the Almighty, then think with thy self; how much greater thy obligation is to examine the rest of his Works. Lookest thou upon me? Behold the man, whom no man will call a Geometrician if he be one himself. Neither did I ever desire to compleat my self in that faculty; I was never taught it, nor did I ever profess to study it. I never read over any chief Author in that Science, no not so much as *Euclide*; but was alwayes delighted with other studies. From Geometry I both expected and attained

ed sufficient for transferring its vigorous proceedings to the Metaphysick. Otherwise it was onely my recreation when I wanted better employment. Since therefore I am such, thou hast not these things from me, but from him, who in his Divine providence, both saw and fitted them for the Government of his Church in this present conjuncture. Give him the thanks; for if thou apply them to me, I shall expostulate the injury done me in laying a greater weight upon me then I am able to bear; and thou wilt lose the reward thou shouldest receive from God. It remains that thou neglect not thy own good, nor condemn a wonder come down to thee from Heaven.

Thus Mr. *White* in his Preface. By all which, and by the Title of his Book, he plainly shews, that according to the clearness and solidity of the following Demonstrations in Geometry, men must take the just measure of the solidity and strength of his other Demonstrations in Philosophy and Divinity. And thus much for those places of the Preface mentioned in the precedent Letter.

ter. I will now set down those that concern the dispute between Mr. *White* and *Gulden*, which are onely two; the former is in *Nota secunda* before the tenth Proposition: the latter in *Nota Quarta* at the end of the twelfth.

Ex Tutela Geometrica ante
Prop. 10.

Nota Secunda.

Finieram, & regulam cum circino consecraturiebam; cum ab amicis monitus sum, quam in Exercitatione Geometrica exhibueram spiralis ad Peripheriam Circuli equationem, à magni nominis Mathematico, & prius excogitatam, & eadem demonstratione confirmatam, & posterioribus consiliis repudiatam fuisse, & oppositâ demonstratione reprobata. Conscius eram, non indiligentè apodixi mea invigilavisse. Terruit tamen hominem (cui omnia alia præ Mathefi præhabita fuerant) tot notis veritatis impressus rumor. Tollo de Tabula manum, & cum typis mandavisssem, quæ sunt præmissa, cætera usque ad examinationem hujus improprietatis sustinenda decrevi.

Author

Author oppositionis erat quidam Paulus Guldenus, ex Societate Jesu, editor justi voluminis, quod pro Geometrico suppositum Centrobaryca appellavit. Quid agerem? ubi degebam, opus illud non apparebat, & negotium quod illic gerebam, ad umbilicum perductum erat, & jam egelidum ver monebat aestivam sedem Ciconiarum monitu vestigare. Contuli me itaque Lugdunum Batavorum, & gratiâ clariss. Mathematicum ibidem Professoris Examinationem Problematis mei aggredior. Primò ipsam revisi; apparuit constantissima: summam tibi sic accenseo, &.

In English thus.

I Had even now ended, and began to lay my Rule and Compass aside, when I was admonished by my friends, that the equation of a Spiral to the circumference of a Circle, which I had demonstrated in my *Exercitatione Geometrica*, had been found out before and confirmed with the same Demonstration, by a famous Mathematician: who afterwards retracted it, and by a contrary Demonstration, shewed it to be

be false. I was conscious to my self that I had not slightly examined my Demonstration: nevertheless a rumor with so many marks of truth somewhat frightened me, being a man that esteemed all other learning before the Mathematical. I presently made a stop, and having printed the precedent part *de Quadratura*, I deferred the rest, till I had examined this reproach.

The retracting Author was one *Paul Gulden* of the Society of Jesus, who had printed a compleat Volume, which he pretending to be a Geometricall Work, called it *Centrobarryca*, What should I do? Where I then lived. this Book was not to be had, and my work in hand was even now finished. Besides the Spring drawing on, did invite me by the crying of the Storks, to seek my Summer habitation. I went therefore to *Leyden* in *Holland*, and with the favour of the most famous Professor of Mathematicks there, I begin to examine my Probleme; I revised it, and found it most solid, Take here the summe thereof, &c.

This is Mr. *Whites* relation of the beginning of the Dispute between him

him and *Gulden*, handsomely, as you see, contrived, that he may not seem to have stollen the said Demonstration out of *Gulden*, but to have fallen upon it himself, or had it from Heaven. Yet all this will not serve his turn, but still the Reader will imagine those words in his Preface, where (speaking of this Demonstration together with the rest) he sayes, *Non hac à me habes, sed ab eo qui ex legibus Providentie sue, &c.* are to be changed thus, (applying them to this particular) *Non hac à me habes, sed à Paulo Guldeno, qui ante triginta ferè annos ea primò invenit, & postea retractavit, &c.* After this relation Mr. *White* proceeds to confirme the said Demonstration and infringe the Retraction of *Gulden*, shewing his computation to be false, as he imagines: which done, he makes his *Nota Quarta*, or invective against *Gulden* in these words.

Nota Quarta.

Calculus itaque Guldenianus impertitas est, & qualem ab ipso acceptari (neque enim vel talem ipse instruxit) decebat,

decebat, homine prorsus Amathemati-
co, ut legenti ipsius scripta prorsus est
patere. Nam dum proportionem Spi-
ralis ad circulum adstruere conaretur,
assumpsit sine probatione proposi-
tionem prorsus improbabilem, nempe,
lineas intra aliam ductas esse minores
illâ. Et si enim videatur de Inscriptis
velle loqui, tamen quas ipse scribit ni-
hil minus sunt quam Inscriptæ, cum
circumscriptam non accedant nisi al-
tero duntaxat termino. Rursus equali
temeritate vult Arcus circuli esse pro-
portionaliter medios inter arcus Spi-
ralis equalium angularum. Sed (quod
fœdissimum est) tanta vanitatis est,
ut cum erravisse sese putaverat, neque
delendo tegere, neque candidè con-
fiteri sustinuerit, sed excusationes texe-
re quasi in ipso errore egregiè se gesserit,
ostentare pergat. Quæ (utpote de
sumpta ex locis Logicis vel Rhetoricis)
clare docent hominem officij Geome-
trici (quod hac respicit) esse prorsus ig-
narum, & ex eo Semidoctorum genere,
qui cum ex magnorum virorum scriptis
egregia multa depeculati fuerint, ut sua
faciant, additis quibusdam levibus,
iusti voluminis ostentatione se vulgò
dis-

discentium ostentant: & (quod perniciosissimum est) mixtis incertis, sacrum Scientia nomen denigrant, ut abunde egit noster Guldennus; Saltationem telluris circa centrum, & consistentiam Centri in puncto imaginario, in Geometricum tractatum inferciens. Huc coactus sum de homine ceteroqui ignoto prodere, quia umbra Tomi illustris, per opinionem consequam, officiebat veritati, quam ejusdem studiosis offerebam. Quantumvis opera pretium erat lectorem monitum reddere de exitiali hac Sciorum Sectâ, quæ sub professione facultatis garriendi omnem certitudinem, tum è Scientiis, tum ex Fide Christianâ tollere molitur.

In English thus.

Wherefore Guldens calculation is unskilful, and such as was fit to be received by him (for he made it not himself *) a man no way vers'd in Mathematick, as his Reader will easily perceive. For endeavouring to give the proportion of a Spiral to a Circle, he assumes without proof a proposition wholly improbable, viz.

* But he there made another more accurate.

E

that

that lines drawn within another line, are less then it. For though he seem to intend to speak of lines inscribed; yet those he describes are nothing less then such, since they touch the circumscribed but with one end onely. In like manner with equal temerity he will have the Arches of a Circle to be mean proportionals between the Arches of a Spiral of equal * Angles. But that which above all is the most detestable, his vanity is so great, that when he thought he had erred, he could neither endure to suppress it, nor candidly to acknowledge it, but proceeds framing excuses, and brags, as if therein he had carried himself very gallantly. All which, being but flourishes of Rhetorick, clearly shew him to be a man wholly ignorant of what belongs to Geometry; which uses no such Arts: and that he is one of those petty Schollars, who having stolen divers excellent things out of other mens Writings, that they may make them seem their own, adde some few trivial matters, and then boast themselves amongst their Schollars as the Authours of a great Volume: and
(which

Both these
are retraced
by
Gulden,
prop. 4.

(which is most pernicious) by mingling many uncertainties, defile the Sacred Name of Science; as this *Gulden* hath done to the full, thrusting into a Geometricall Treatise the Dancing of the Earth about its Center, and the Consistency of the same Center in an Imaginary Point. These things I was forced to publish of a man otherwise unknown to me, because the shadow of so fair a Tome, through the opinion it had gain'd, hindered the light of that truth, which I propos'd to those that sought it. Nevertheless it was worth the labour, to admonish the Reader of this pernicious Sect of Sciolists, who under profession of the Faculty of Prating, endeavour to remove all certainty, as well from Sciences, as from Christian Faith.

Hitherto we have heard, or rather seen Mr. *Whites* gall against this Author, through whose sides he unworthily seems to endeavour the wounding of his whole Order, under the title of *Exitialis Sciolorum Secta*. Truly a man would wonder to see, how stu-

diouſly and compleatly Mr. *White* here acts the part of a malicious Detractor, ſeeking every way to deſame his Adverſary : for beſides what we have already heard in the precedent Letter, he intimates him here to be ſo little verſed in the Mathematicks, as not to be able to make even the computation of a Polygone of twelve ſides : for ſpeaking (as we have heard) of ſuch a Calculation which he terms unkiſful, and calls it *Guldens*, (though he tells us withal, that *Gulden* made it not himſelf, but received it from another) he maliciously inserts in a Parentheſis, *Neque enim vel talem ipſe inſtruxit*, thereby to inſinuate, that *Gulden* was unable to frame ſo trivial a Computation, as he (Mr. *White*) eſteemed this. Wherein yet he could not be ignorant of the great injury he did this Author ; who having ſet down the ſaid Calculation of twelve ſides, acknowledging it to be none of his own, but ſent him from another, he examines and approves it in *prop. 1. c. 3. lib. 2.* Which done, he preſently in *prop. 3.* exhibites another of his own far more accurate, as conſiſting of a thouſand ſides, and per-

performed by a different way of computation, with laborious Tables expressing the quantity of each particular side: thence also probably inferring that the proportion of the said Spiral to the half Circumference is as 1961 to 1818 *proximè*. Yet Mr. *White* would take no notice of this Computation, although it were so near the place from whence he took that other of twelve sides.

But having attained his end in this he proceeds, finding a means to asperse him with a censure of absolute ignorance in the Mathematicks: where that the Reader may see Mr. *Whites* malicious way of proceeding, he must know that *Gulden* (as we shall presently hear in his own words) having (before the printing or publishing the often mentioned Demonstration of the Spiral) discovered by help of a Friend an error therein, thought good notwithstanding to print it, not as a true one, but as erroneus. This he performs in *c. 2. lib. 2.* and presently *c. 3.* shews and refutes all the particular errors committed in *c. 2.* to the end that others advertised of the errors

committed in *cap. 2.* might beware of committing the like; *Ut sciant* (saith he) *sibi cavere à scopulis.*

Now here Mr. *White* playes his game, and taking no notice at all of this, playes upon *Gulden*, as if he had affirmed the contents of *cap. 2.* to be really true; which, as I said, *Gulden* did publish as absolutely false: then which a more unworthy proceeding can hardly be imagined, as will now appear.

For in the above named *Nota Quarta*, Mr. *White* terms him, *Hominem prorsus Amathematicum*, a man utterly ignorant of the Mathematicks, in assuming (as he sayes) without proof a Proposition wholly improbable, viz. that *Lines drawn within another are less then it.*

But in this Mr. *White* extreamly wrongs the Authour, who onely sets down *cap. 2. Prop. 3.* the said Proposition as erroneous, which he took at first sight to be true; and afterwards *cap. 3. Prop. 1.* at large declares the error. Which had he not done, I dare boldly affirm, that all Mr. *Whites* Geometry would never have been able to discover

ver. But by this proceeding Mr. *White* thinks to attain what he aimed at; viz. the depressing of *Gulden*, and the exalting of himself. For by concealing *Guldens* refutation of the said Proposition, on the one side he would give the world to understand, that *Gulden* was not able to see and rectifie the error: on the other he would gain to himself the opinion of a sharp wit, and deep insight into the Principles of Geometry, in being able to detect what so great a Mathematician (as he reports in his *Nota secunda* that *Gulden* was esteemed) could not perceive: whereas indeed if *Gulden* had not put it into Mr. *Whites* head, it had never been there. But to seek the glory of a great Wit and profound Mathematician, as also to purchase an esteem to all his other Writings by such Arts as these, is a thing most unworthy of a Gentleman. And though such Artifices may for a time, by some more affected to him then learned to discover them, be received with applause; yet at last they will be discovered, as here they are, and instead of the hoped glory, bring nothing but

shame to such as use them.

Lastly, he accuses *Gulden* of rashness for affirming (as he sayes) the circular Arches to be mean proportionalls between the Spiral Arches of equal Angles. Wherein he uses the like artifice as before, by making *Gulden* assert even what he absolutely denies. For this Assertion corresponds onely to what *Gulden* sayes in the said *cap. 2. Prop. 8.* where he delivers it as false, and after proves the falsity, *cap. 3. prop. 4, n. 6.*

Thus much for Mr. *Whites* invective against *Gulden*; let us now, if you please, hear *Gulden* speak himself, and see whether there appear in his words that great vanity, stubbornness, want of candour, and such ostentation as Mr. *White* reproaches him with: and thereupon frame a judgement of them both, accordingly. *Gulden* therefore in the Preface to the *cap. 3.* gives a full account of his retracting the Demonstration of the Spirall: which is as followeth.

De Centro Gravitatis,

Lib. 2. Cap. 3. Pag. 58.

Examen eorum quæ proxime
præcedenti capite tradita sunt.

Hucusque ergo, amice Lector, nova
hec, & non minùs jucunda quàm
pulchra, de lineis Spiralibus speculatio
non tam traxit, quàm tum equis quàm
velis suavissimè nos provexit, nullum
sive in aquore sive in montibus nobis ti-
mentes vel periculum apertum, vel insi-
dias latentes. Nam regiâ nos incedere
viâ scivimus potiùs, quàm arbitrati su-
mus; & solùm intenti fuimus quâ ra-
tione, Scopum videlicet nostrum intuen-
do, nobis paulatim semitam ad indagandum
Linea Spiralis Gravitatis Centrum com-
modè prapararemus. Occurrerat sapius
quidem, dum hac tractaremus, non levis
cogitatio; quæ tamen ob certas rationes
nos in capto retardare minimè visa est:
nimirum si hæc Spiralis Linea dimensio
tam obvia, tam commoda, tamque ordi-
nata est, ut nos eam invenimus; tam fa-
cile etiam progreditur, tamque firmis
potest

potest roborari Demonstrationibus; cur eam non Magnus Archimedes, qui ea, quæ aliis de Lineâ Spirali proposuerant, ipse admirabili (ut cum Pappo loquamur) quâdam aggressione demonstravit; cur eam (inquam) Dimensionem libro suo De Spiralibus non inseruit? Sed facile nobis ipsis responsum dedimus: ipsum videlicet Archimedem plura alia, quæ tamen alii post ipsum tractârunt, vel neglexisse, vel studio ac volens præteruisse; vel etiam jam ab ipso tractata, injuriâ temporum, intercidisse. Quemadmodum etiam fecit, cum de Planorum centro ageret gravitatis: omisit enim Tractatum de centro Linearum. Et sicut nos non absterruit illa objectio ab indagatione Centri Gravitatis Linearum, præsertim Circularium; sic & hic nobis ipsis fecimus animos novi aliquid circa Spirales inveniendi, quod vel ipsum Archimedem fugere, aut posteros nos latere potuerit.

Et nostro quidem judicio rem tunc feliciter & incepimus, & in eâdem magnis etiam itineribus perreximus. Sed ecce dum hoc loco in medio quasi essemus cursu, portumque etsi valde procul adhuc positum, jam à longè tamen jam jam
con-

conspiceremus, vela repente & erant contrahenda, & securitatis causâ ad legendâ littora prora convertenda. Incidi enim tunc primùm in Examen quoddam, per numeros institutum, dimensionis Linea Spiralis; de quo antè quidem inaudiveram, sed qualiter aut quâ ratione dimensio illa progrediretur, cum rectâne, an cum curvâ, aut purè circulari, Spiralis illa linea conferretur, omninò nesciebam: tantum abest, ut ipsam justam proportionem, à nobis inventam, inde redargui posse suspicarer. Quare ex primo illius aspectu nequaquam sum territus; quippe qui meis fidebam Demonstrationibus, tam Geometricis quam Arithmeticis, quas irreprehensibiles esse judicavi. Hostem tamen qualem qualem saepe audivi spernendum esse minimè: quippe qui, quando minimè putamus, vel obesse vel nocere possit.

Examinavi igitur examen illud; quo in labore mille potius sperabam me inventurum in calculo hujus examinis errores, quàm vel unicum in meis inventis. Sed contra quasi accidit. Reperi enim Lineam Spiralem primæ Circulationis majorem esse Semiperipheriâ primi Circuli; & tacitè victusque ma-

nus dare debui. Quid facerem? Dissimu-
 laremne? Tacerem? Mordicus mea,
 instar Circuli Quadratorum supra no-
 minatorum, defenderem? Et Archime-
 dem ipsum Euclidemque in jus vocarem,
 accusarem, condemnarem? Nequaquam.
 Sed servandum mihi duxi id, quod ipse
 Jos. Scaliger sibi met quidem servandum
 præscripsit, at minime servavit. Sic enim
 in Appendice ad sua Cyclometrica habet.
 "Primum, aio, in omnibus Scientiis &
 "Artibus posse saepe tolerabiliter pecca-
 "ri: in Mathematicis ne semel quidem
 "debere. Nam ut ait quidam vetus
 "Scriptor, Πάντα τέχνη μεθοδεύμενα
 "ἀδιαμάσττον ἔχειν ἰσχύει τῶν ἀπό-
 "φαισιν. Itaq; cum Mathematicus erro-
 "rem suum deprehenderit, primus occu-
 "pare debet Me, Me, adsum, qui feci.
 "Postquam autem per alium id cogno-
 "verit, si non statim Castigatori gra-
 "tias agit, malè de homine; si non corri-
 "git, malè de Mathematica meritis est.
 Verum bonus ille Scaliger præcipuos erro-
 res suos, atro & rubro colore jam edi-
 tos, non solum non correxit; sed &
 majori inscitia animique tumore pertina-
 citer defendit. Conclufi ergo, in meis
 inventis alicubi peccatum esse. At ubi
 lateret

lateret anguis in herbâ, non ita facile ne-
que statim videre aut judicare potui.
Quare Scripta mea amico in Mathema-
ticis benè docto dedi perlegenda, ut an ea
sibi constarent animum diligentèr ad-
verteret, suumque mihi de iis iudicium
candidè aperiret, eundem rogavi.

Verùm enim verò dum ille differret
lectitandi operam, ipse errorem meum re-
peri, & digito (quod aiunt) demonstrare
potui. In eo solùm hæsî, an totum illud
Caput præcedens; cum principi meo in-
tento ac fini nihil tolleret; parum, etiam si
omnia vera essent, adferret, omittendum
esset, totumque negotium mensurationis
Lineæ Spiralis dissimulandum: an vero,
prout jam scripta essent omnia, unâ cum
hoc Examine edenda. Occuriebant ra-
tiones plures & varia, prò & contrâ:
Vicerunt tamen illa, quæ in bonum alio-
rum laborem horum, partem saltè aliquam,
ipsis communicandum esse, cæteris
prælata sunt, suasêrunt & persuaserunt.
Præsertim cum non desint exempla Au-
ctorum, qui & cum laude suâ & cum
utilitate Lectorum idem factitârunt:
quî si nullum aliud hinc auferrent fru-
ctum, is saltè satis esse posset, quod in-
veniant cautionem, ut si curiosius sive
de

de Spiralibus, sive de alijs inquirere velint, sibi sciant cavere & à scopulis, & ab alijs incommodis, in quæ facillimè incurrere possent. Geometria profectò ipsa, secundum judicium Josephi Scaligeri suprà cap. primo Propos. 4. num. 7. adductum, sibi inprimis gratulabitur, quòd accessione saltem novorum aliquot Epichirematum locupletata sit.

Primum igitur indicandum est, qualiter in cognitionem venimus inventa nostra lubrica esse fidei; deinde, ubinam hæreat error, ostendendum: tum singula propositiones examinande, & pro meritis approbanda vel reprobanda, & siquidem id fieri commodè poterit, erroneas corrigende. Omisimus autem plurima jam conscripta, bonoque ordine ac methodo digesta; quæ si rationibus suis solidè nixa fuissent, Lectori plurimum oblectationi esse potuissent: cum verò vacillantia ea inventa fuerint, ne fastidio potius essent, jure meritò ea præterivimus. Non esset autem abs re cogitationem suscipere, qualisnam aut quæ sit illa flexuosa linea, & quâ arte illa compendiose describi possit, quæ illas haberet proprietates, quas frustra Spirali attribuimus. Id quod in aliud tempus, vel potius aliis faciendum reservamus.

Pro-

Propositio prima.

Occasionem Examinis hujus ac
Dubitationis pressius
declarare.

Fuisse quendam, qui Dimensionem
Lineae Spiralis ante nos instituerit,
memini me aliquando audivisse ex P.
Hieronymo Kinig Societatis nostrae
Mathematico, & olim in Ingolsta-
dianâ, Dilingardâ, ac Pragensi Aca-
demiis earundem Mathematicarum
Disciplinarum Professore accuratissimo,
mibi & Romae & alibi natissimo; imò
eundem Lineam illam alicui alteri
equalem, sine tamen ullâ Demons-
tratione, pronunciasse; quod assertum di-
ctus ille Professor examinaverit: cui
vero Linea illam adequaverit, non so-
lùm tunc scire, verum an aliquando id
sciverim planè meminisse non potui.
Cum ergo versarer in scriptione supe-
rioris Capituli, venit in mentem Examen
illud quod diximus, recordatione tamen
satis confusâ. Existens ergo Gracii
in Sciriâ scribo Viennam, ubi Mathe-
maticus

maticus ille manebat; & siquid haberet his de rebus in Scripto, ad me mitteret rogavi: non quòd incertus essem de meis jam inventis & scriptis, aut ullo modo de iisdem dubitarem, sed ut illud ipsum cum meis conferrem. Annuit ipse, & sequens ad me misit, sive Examen, sive contra Asserta instantiam & reprobationem: quam cum examinasssem, ut suprà diximus, eam veritati consonam esse, manifestè deprehendi. Sic autem se habebant illa.

2. Propositum sit demonstrare, Lineam Spiralem majorem esse Semicircumferentiâ; Intellige Circuli primi eam comprehendentis.

The same in English.

The Center of Gravity.

Lib. 2. Cap. 3. Pag. 58.

THUS far (Courteous Reader) had this new, and no less specious then delightful speculation on the subject of Spiral Lines rather swiftly advanced me, by Sea and Land as I may say, then slowly drawn me, who apprehended nothing either of apparent danger, or unexpected surprize. For indeed I rather knew, then imagined, that I travelled in the High Road; and looking stedfastly on my main design, I was wholly attentive to the means whereby to tread out a commodious Path for the Discovery of the *Center of Gravity* in the *Spiral*. True it is, while I was plodding thereon, a serious reflection came often into my minde, which yet, for certain reasons, was not sufficient to retard my course, *viz.* That if this Dimension of the Spiral Line were so obvious, easie, and commodious a thing, as I found it

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to

to be ; as also strengthened with such firm Demonstrations , how came it to pass that the great *Archimedes* , who (to speak with *Pappus*) did with admirable Dexterity demonstrate those Proprieties of the Spiral Line , which other men had onely hinted at ; how came it, I say, to pass that he did not insert this Dimension into his Book of *Spirals* ? But I easily answered my self ; to wit, that *Archimedes* had either neglected or purposely omitted many other things , which have since his time been treated by others, or else it must be, that what he wrote thereof, hath perished by the injury of time. The like he did when he treated of the *Center of Gravity in Plains* ; for he omitted the Tract of the *Center of Lines*. And as that objection deterred me not from enquiring the Center of Gravity in Lines, especially Circular ones , so here I encouraged my self in hope to discover something new concerning *Spirals* , which hitherto had escaped both *Archimedes* and all that had come after him.

And truly in my opinion I began the business happily enough , and had made

made a great progress therein ; but on a sudden when I was half way on my Voyage, and came within Kenning of the Port, I was fain to strike Sail, and for security, to make directly towards the shore : for I then first lighted on a certain Examen of the Dimension of the Spiral Line, performed by numbers : whereof indeed, I had heard before, but could not tell how or which way that Dimension proceeded : or whether that Spiral were to be compared with a right Line or crooked, or a pure Circular Line. So far was I from suspecting, that the exact proportion I had already discovered, could be disproved thereby. So that I was nothing at all troubled at the first sight of this *Examen*, as being very confident of my own Demonstrations, both Geometrical and Arithmetical, which I thought to be irreprehensible. Yet I had often heard, that an enemy, how mean soever he seems, ought not to be contemned ; for when we least think of him, he may hap to stand in our way, if not do us a mischief.

I took in hand therefore to examine

* See how unjustly Mr. White charges this Author of obstinacy, for not confessing his error.

that *Examen*, promising my self to discover a thousand errors in his Calculation, rather than one in my own Inventions. But it happened far otherwise; for I found that the *Spiral Line* of the first Revolution was greater than the Semi-circumference of the first Circle: so that I saw I was fairly to submit. * For what should I do? Should I dissemble the matter? Should I hold my peace and conceal it? Or should I, with those Squarers of the Circle above-mentioned, obstinately defend my own Assertion, though I knew it to be false? Should I dare to question, accuse, yea and condemn *Archimedes* and *Euclide* himself, to maintain my own opinion? By no means. I resolved therefore to observe the Rule, which *Joseph Scaliger* once prescribed to himself, but never observed. It is in the *Appendix* to his *Cyclometriques*; where he thus speaks. "I grant, saith he, that in all other Arts and Sciences, error may be tollerably committed oftentimes: but in the *Mathematiques* it ought not so much as once. For as an old Writer saith, Πάντα τὰ ἐν τῇ μεθόδῳ μετὰ ἀδιαμέσσητον, &c. All things digested by

" by Art ought to have an unreprieve-
 " able evidence. So that a Mathe-
 " matician observing his own error,
 " ought before all others to cry out,
 " 'Tis I, 'tis I, here I am that did it.
 " But if he comes to know it by means
 " of some other person, unless he
 " presently gives thanks to his Cor-
 " rectour, he is ill-deserving towards
 " the man; but if he do not presently
 " amend his error, he wrongs the
 " Science it self. Yet this honest *Sca-*
liger was so far from correcting his
 own over-sights, published both in
 black and red, that with greater igno-
 rance and animosity he still obstinately
 defended them. I concluded therefore
 with my self, that something was amiss
 in my Deductions. But where this
 Snake (the error) lay, I could neither
 so easily nor so presently perceive.
 Wherefore I gave these my Writings
 to a Friend well skilled in the Mathe-
 maticks to read them over; entreating
 him to consider as attentively as he
 could, whether they were consistent or
 not; and that he would impart his
 judgement of them to me with all
 candour and clearness.

But to tell you the plain truth, while my Friend deferred somewhat the pains of reading my Writings, I in the mean time discovered the error my self, and was able (as the Proverb saith) to point it out with my finger. Onely I could not well resolve, whether I should now wholly lay aside the foregoing Chapter, (seeing that to do so would not be any prejudice to my principal intent, as on the other side it would not have added much to it, though every thing therein had proved true) and so dissemble the whole matter concerning the measuring of the *Spiral Line*; or otherwise should publish whatsoever I had written on that Subject, together with this *Examen*. Many and various Reasons occurred to me *Pro* and *Con*: but at last those prevailed, which for the * good of others inclined me to think that some part at least even of those my Labours, was not to be denied to the publick. Especially seeing there wanted not the examples of Authours, who to their own praise, and the benefit of their Readers have done the like; who though they should hap-

* See if this Author not expunging his error proceeded out of pride, as he is accused.

happen to reap no other profit by it, yet were this alone sufficient, that they have here a *Caveat* given them, that in case they should themselves desire to search more curiously into this Subject of *Spiral Lines*, or any other of like nature, they should proceed warily and advisedly in the † business, for the avoiding of those rocks of inconveniences and error, which otherwise they will most easily run upon. And lastly, that *Geometry* it self, even according to the judgement of the same *Joseph Scaliger*, (cap. 1. prop. 4. num. 7.) should rejoyce, being enriched thereby with the Addition of some New Endeavours.

† Where is now that great vanity Matter White would pin upon this Authour?

The first thing therefore here to be done is to declare, how I came to know that my Inventions were but doubtful and uncertain; next to shew where the error lyes; and lastly to examine all the severall Propositions, with approbation or rejection of them according to their merits; yea (where it may conveniently be done) by rectifying and correcting those which are erroneous. Yet many things I have omitted, though already written,

and digested by me into due order and method; which had they been built upon good and solid grounds, would have given great delight to the Reader. But finding them loose and slippery, (to avoid offence) I have justly laid them aside. However, it might (perhaps) be matter not unworthy our consideration, to think what manner of Bending Line that is, (and also how it may be compendiously drawn, and described) which might be found to have all those properties, which in the *Spiral Line* we have hitherto but vainly sought. But that's a thing I must defer to some other time, or rather leave to other persons to perform.

The First Proposition.

More particularly to declare the occasion of this following *Examen*, and of Doubting.

THat there was one, who before me had attempted the measuring of the *Spiral Line*, I remember well to have heard long since from the mouth of *Father Hierome Kinig*, a Mathe-

Mathematician of our Society, and
 formerly a most accurate professour of
 those Sciences in the Universities of
Ingolstadt, *Dillingen*, and *Prague*;
 whom I knew very well both at *Rome*
 and elsewhere; yea, that the abovesaid
 person had affirmed (but without any
 Demonstration given) that the said
Spiral Line was exactly equal to some
 other Line: which Assertion of his
 the said professor did also examine.
 But to what Line he made the *Spiral*
 to be equal, I cannot possibly call to
 minde, whether I did either then, or
 any other time know it in all my life.
 Whilest therefore I was writing the
 precedent Chapter, I hapned to think
 on the afore mentioned *Examen*; yet
 remembring it but confusedly, and in
 gross. Whereupon being at *Graz* in
Stiria, I wrote to *Vienna* where the
 said Mathematician then was, and en-
 treated him; that if he had any thing
 of this Subject, he would send it in
 writing to me; not that I was then
 any way jealous of my self, or did in
 the least measure doubt of my own
 writings and discoveries; but onely
 that I might communicate what I had
 writ-

written, with those of my own profession. He forthwith yielded to my request, and sent me this following *Examen*, or rather refutation of the things I had asserted; which having my self examined, (as I said before) I manifestly found it agreeable to truth. Now that which he wrote was as followeth.

2. The second Proposition may be to shew, that the *Spiral Line* is greater then the Semi circumference, to wit, the Semi-circumference of the first Circle that contains it.

Though I had here ended my additional Vindication of a worthy Mathematician by the name of *Gulden*, because I found him so written by the Author of the precedent Letter, as following Mr. *White*, who names him *Paulus Guldenus*; yet I thought it not amiss to advertise the Reader before I took Pen from Paper, that his Adversary could not be ignorant that he calls himself *Paulus Guldinus* in his own printed works, not *Guldenus*. Whereby one may probably conjecture, that this was a meer affected mistake

stake in Mr. *White*, to confirm his Reader in the belief of that incredible story he delivers, that he had never either seen, nor heard of this Authors Work, till his own was ready for the Press.

FINIS.
